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IS 4253-1 (2008): Cork Composition Sheets, Part 1: Plain Cork Sheets [MED 30: Gaskets and Packing]

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भाग 1 सादी कार्क शीट

(दूसरा पुनरीक्षण)

Indian Standard

CORK COMPOSITION SHEETS — SPECIFICATION

PART 1 PLAIN CORK SHEETS

(Second Revision)

ICS 674.883

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

November 2008

Price Group 3

Gasket and Packing Sectional Committee, MED 30

FOREWORD

This Indian Standard (Part 1) (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Gasket and Packing Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first issued in 1967 and subsequently revised in 1980. In this second revision Amendments, No. 1 and 2 have been incorporated. The clauses with regard to sampling, dimensions, compressibility and recovery, and immersion test have been modified.

The composition of the Committee responsible for the formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard
CORK COMPOSITION SHEETS — SPECIFICATION
PART 1 PLAIN CORK SHEETS
(Second Revision)

1 SCOPE

1.1 This standard (Part 1) specifies the requirements and methods of test for cork composition in the form of single layer sheets for use in systems involving petroleum fuels, lubricating oils, etc, in automotive applications and general purposes.

1.2 Cork composition sheets covered in this standard are not applicable for use in food industry.

2 REFERENCES

The following standards contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
460	Specification of test sieves:
(Part 1) : 1985	Wire cloth test sieves (*third revision*)
(Part 2) : 1985	Perforated plate test sieves (*third revision*)
2500 (Part 1) : 2000	Sampling inspection procedures: Part 1 Attribute sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection (*third revision*)
2967 : 1983	Specification for external micrometer (*first revision*)
3400 (Part 1) : 1987	Methods of test for vulcanized rubbers: Part 1 Tensile stress strain properties (*second revision*)

3 GRADES AND MATERIALS

The cork sheets shall be graded as shown in Table 1 and identified by the type of bonding.

3.1 The cork composition sheets shall be manufactured from clean, soft grade, uniformly granulated cork free from hardboard, wood flour, dust and other foreign material and thoroughly bonded with protein or resin binding materials. It shall be free from cracks or pinholes and shall be capable of being punched without cracking or tearing.

3.1.1 Unless a particular grain size is specified by the purchaser, the size of the cork granules used shall be that which the manufacturer considers most suitable for the particular application. The granules shall be classified as follows:

a) Fine : Passing through 1.00 mm IS Sieve and retained on 425-micron IS Sieve,

b) Medium : Passing through 2.00 mm IS Sieve and retained on 1.00 mm IS Sieve, and

c) Coarse : Passing through 3.35 mm IS Sieve and retained on 2.00 mm IS Sieve.

NOTE — For the Indian Standard sieve designations and their equivalents according to BS, ASTM, Tyler, French and German Standards, *see* IS 460 (Part 1) and IS 460 (Part 2).

4 DIMENSIONS

4.1 The preferred thicknesses for cork composition sheets shall be 0.8 mm, 1.6 mm, 2.0 mm, 2.5 mm, 3.2 mm, 4.0 mm, 4.8 mm, 6.3 mm, 8.0 mm, 10 mm, 12.7 mm, 16.0 mm and 19 mm.

4.2 The permissible variation in thicknesses shall be ±10 percent for thicknesses above 1.6 mm and ±18 percent for thicknesses below 1.6 mm unless otherwise agreed to between the manufacturer and the purchaser.

4.3 The properties of cork composition sheets shall be as given in Table 1.

5 SAMPLING

The sampling plan shall be as mutually agreed to between the manufacturer and the purchaser in respect of tests to be conducted. In the absence of such agreement the purchasers to follow sampling plan given in Annex A and may test the material for conformity at their works.

6 FUNGUS-PROOFING

When required by the purchaser, the gaskets shall

Table 1 Property of Cork Composition Sheets

(*Clauses* 3, 4.3, 7.3.1, 7.4.1, 7.5 *and* 7.6.1)

Sl No.	Property	Protein Bond Type				Resin Bond Type			
		Grade P22	Grade P27	Grade P32	Grade P38	Grade R22	Grade R27	Grade R32	Grade R38
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	Density, g/cm^3, *Min*	0.22	0.27	0.32	0.38	0.22	0.27	0.32	0.38
ii)	Tensile strength, kPa[1)], *Min*	300	500	650	800	350	500	650	800
iii)	Compressibility at 700 kPa, percent	30/50	30/50	25/40	15/30	30/50	30/50	25/40	15/30
iv)	Recovery, percent, *Min*	70	75	75	65	75	75	75	65
v)	Dimensional change, *Max*, percent	2.5	2.5	2.5	2.5	1.5	1.5	1.5	1.5
Gaskets are suitable for (abbreviations)		GP	GP	A	E	GP	GP	GP	GP

[1)] 1 kgf/cm^2 = 98.066 5 kPa.

NOTE
GP — general purpose only,
A — automotive industry, and
E — light electrical and general automotive industries.

be treated to provide complete protection against microbiological attack by complete immersion in a suitable fungicide (such as a solution of *p*-nitrophenol or pentachlorophenol) for not less than 2 min, followed by draining and drying.

7 TESTS

7.1 Unless otherwise specified, all tests specimens shall be conditioned at 27 ± 2°C and 65 ± 2 percent relative humidity for 48 h before subjecting to tests.

7.2 Dimensions

The thickness shall be measured by a Grade 2 micrometer having an anvil of not less than 10 mm diameter (*see* IS 2967). The thickness shall be within the variation specified in **4.1** and maximum permissible variation in thickness between any two points not more than 250 mm apart shall be as given below:

Nominal Thickness mm	*Variation* mm
Up to 2.0	0.10
Above 2.0 to 3.0	0.15
Above 3.0	0.20

7.3 Dimensional Stability

One test piece at least of size 150 mm × 150 mm shall be drawn from each of the cork composition sheet selected. The test pieces shall be taken from corners and centre so that all the positions in the sheet are represented.

7.3.1 Test pieces, with length, width and thickness measured, shall be conditioned in a humidity cabinet for 48 h in an atmosphere of 65 ± 2 percent relative humidity and temperature of 27 ± 2°C. These pieces shall then be kept in an oven at a temperature of 50°C for 24 h and conditioned for 24 h at 27 ± 2°C and 65 ± 2 percent relative humidity. The length, width and thickness of the conditioned test pieces shall be measured and the residual shrinkage, if any, in each dimension shall be calculated as a percentage. The change in dimensions shall not be more than the value specified in Table 1.

7.4 Density

Test piece shall preferably be square or rectangular in shape and have an area of at least 100 cm^2. It shall be weighed correct to 0.1 g and its dimensions determined. The density is then calculated by:

$$\text{Density} = \frac{\text{Mass, in g}}{\text{Volume, in cm 3}}$$

7.4.1 A cork composition sheet shall be considered satisfactory for the characteristic, density, if the value obtained as in 7.3 is greater than the corresponding value given in Table 1.

7.5 Tensile Strength

One test piece shall be cut from each cork composition sheet selected and tested for tensile strength on a tensile testing machine. The pieces shall be cut with a die or other suitable means to give clean-out edges. The test piece shall be dumb-bell, shape and size shall be as per IS 3400 (Part 1). The rate of traverse of jaw shall be 300 ± 30 mm per minute. Load shall be applied and tensile strength calculated in kPa[1]. Where the test specimen breaks at the chucks the readings shall be disregarded. The value of tensile strength shall be not less than that specified in Table 1 for that grade.

7.6 Compressibility and Recovery

One test specimen shall be cut from each cork composition sheet selected. The test specimens shall have an area of 650 mm^2 in the form of a circle and shall consist of single ply or a number of superimposed plies sufficient to give a minimum thickness of 3.2 mm.

a) *Anvil* — A hardened and ground surface of 31.7 mm, *Min* diameter.

b) *Perpetrator* — A steel cylinder of 28.7 mm diameter with its end hardened and ground. It shall travel in its descent in such a manner that the surface shall remain parallel to the surface of the platen.

c) *Dial indicator* — To show the thickness of the compressed specimen with an accuracy of 0.002 mm.

d) *Pre-load* — It shall include the weight of penetrator and added weight to give the load of 4.4N ± 1percent.

e) *Loading device* — A device for applying the specified major load to the upper end of the penetrator. The device may consist of an arrangement of dead weights, a hydraulic cylinder or any other means by which specified major loads at a slow uniform rate and to an accuracy of ±1 percent. The major load shall be 440N.

7.6.1 The test piece or few plies of test pieces, to make an overall thickness of about 32 mm shall be centered upon the lower platen and pre-load applied and maintained for 15 s and thickness t_1 of the test pieces shall be measured. Immediately after, the major load shall be applied gradually so that the full load is obtained in 10 s. This shall be maintained for a period of 1 min at the end of which the thickness t_2 of the test pieces shall be determined. The major load shall then be immediately removed and after a period of one minute the thickness t_3 of the test pieces under the original pre-load shall be determined. The compressibility and recovery shall be calculated as under:

$$\text{Compressibility, percent} = \frac{t_1 - t_2}{t_1} \times 100$$

$$\text{Recovery, percent} = \frac{t_3 - t_2}{t_1 - t_2} \times 100$$

The values of compressibility and recovery shall not be less than those specified in Table 1 for that grade.

7.7 Flexibility

Test pieces 180 mm × 30 mm shall be cut from widely different positions of the sample (if desired size is not obtainable, nearest approach to the size may be made). After conditioning in an atmosphere of 65 ± 2 percent relative humidity at 27 ± 2°C for 48 h, the specimen shall be bent through 180° round a mandrel of diameter as given below:

a) Up to and including 3.2 mm thickness — 5 times the thickness of material, and

b) Above 3.2 mm thickness — 7 times the thickness of material.

The specimen shall show no sign of cracking or breakage.

7.8 Fluid Resistance Test

Samples of preferably not less than 255 mm^2 in area shall be completely immersed by some suitable means in:

a) water for 3 h at 100°C, and

b) 35 percent hydrochloric acid for 30 min.

On removal from fluids, the samples shall show no disintegration or deterioration in case of water and a slight disintegration in case of 35 percent hydrochloric acid.

7.9 Moisture Content

Cork pieces of suitable size shall be taken and weighed in marked tared bottle. The bottle shall then be placed in an oven and heater at 105°C for 1 h. The bottle is then taken out and weighed immediately and the moisture content calculated as follows:

$$\text{Moisture content, percent} = \frac{(b - c)}{(b - a)} \times 100$$

where

a = mass of the tared weighing bottle, in g;

b = mass of tared bottle with cork pieces, in g; and

c = mass of tared bottle with cork pieces after heating, in g.

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[1] 1 kgf/cm^2 = 98.066 5 kPa.

Depending on the use, the moisture content shall be as agreed to between the manufacturer and the purchaser.

7.10 Determination of Water Soluble Matter

Test pieces of suitable small cut pieces shall be dried to a constant mass in a desiccator over fused granular calcium chloride at normal temperature and pressure. These shall then be placed in a chemically-resistant glass flask and about 100 ml of distilled water added. The flask shall be fitted with a water-cooled reflux condenser with a ground-glass connection and the water heated to boiling point for 1 h. The test pieces shall then be carefully removed, rinsed with distilled water, dried to constant mass in an air oven at 100 ± 2°C, cooled in a desiccator and reweighed. The loss in mass of the test piece, calculated as a percentage of the original dry mass, shall be taken as a percentage of water soluble matter originally present in the dried sample. The water soluble matter shall not be more than 8 percent.

7.11 Immersion Test

Test pieces of size 25 mm × 50 mm of cork composition sheets when floated in following test fluids under specified conditions shall show no disintegration:

a) 24 hours at 120°C in oil having the following characteristics:

   Aniline point : 123.9° ± 1°C

   Kinematic viscosity : $19.5 \times 10^{-6} \pm 2 \times 10^{-6}$ m^2/s measured at 99°C

   Flash point : 244°C, *Min*

   For the above test oil may be napthenic or paraffenic or aromatic.

b) 24 h at room temperature in 2, 2, 4-trimethylpentane (70 percent isooctane, 30 percent toluene).

8 MARKING

8.1 Cork composition sheets shall be marked indelibly with:

a) Manufacturer's name or trade-mark (if any),
b) Date of manufacture, and
c) Grade.

The marking of the grades shall be such that it may be readily identified on a piece of 300 mm × 300 mm cut from any position on sheet.

8.2 BIS Certification Marking

Cork composition sheets may also be marked with the Standard Mark.

8.2.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 PACKING

Cork composition sheets shall be suitably packed to prevent damage.

10 STORAGE

Cork composition sheets shall not be stored under conditions of temperature, humidity or for unreasonable period of time, which are likely to cause deterioration.

ANNEX A

(*Clause* 5)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment, all the cork composition sheets of the same dimensions and grade shall be grouped together to constitute a lot.

A-1.2 For ascertaining the conformity of the lot to the requirements of this standard, tests shall be carried out from each lot separately. The number of cork composition sheets to be selected at random for this purpose shall be according to Table 1 of IS 2500 (Part 1). Inspection level, general and special, shall be as agreed between the manufacturer and the purchaser.

It shall be ensured that lots containing 2.5 percent or less defectives will be accepted most of the times for dimensional requirements and no defective will be accepted in case of other requirements.

A-1.2.1 To ensure the randomness of selection, random number tables as agreed between the buyer and the supplier shall be used. In case the tables are not available, the following procedure may be followed:

> Starting from any item in the lot count all the items in one order as 1, 2, 3...etc, up to *r* and so on, where '*r*' is the integral part of *N*/*n* (*N* being the number of items in the lot and *n* the number of items to be selected). Every '*r*th' item thus counted shall be withdrawn to constitute the sample.

A-1.2.2 If the cork composition sheets are packed in different packages, a suitable number of packages (not more than 20 percent of the total in the lot) shall be selected at random and the required number of cork composition sheets shall be drawn, as far as possible, equally from the packages selected.

A-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

After conforming dimensional requirements, a number of cork composition sheets (as per special inspection level) shall be subjected to the tests for density, tensile strength, compression and recovery, dimensional stability, immersion and water soluble matter. All cork composition sheets in the sample size (special inspection level) shall meet the other requirements of this specification for conforming of the lot.

The lot shall be declared conforming to the requirements of this standard, if it satisfies the above requirements.

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Gasket and Packing Sectional Committee, MED 30

Organization	*Representative(s)*
IIT Kharagpur, West Bengal	Shri Ajit K. Banthia (***Chairman***)
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